## REMARKS/ARGUMENTS

Claims 1 - 30 are pending in the application.

In paragraph 1 of the Office Action, the examiner objected to certain informalities in the specification. These informalities have been corrected by the foregoing amendments.

In paragraph 4 of the Office Action, the examiner rejected claims 1 - 30 under 35 U.S.C. 112 as indefinite, specifically with reference to the use of the terms "relatively low" in claim 1, "width and thickness of the same order" in claim 14 and "the metal silicide" in claim 16.

The problem with claim 16 was a typographical error in its dependency, which has been corrected by the foregoing amendment.

The rejection with respect to the other terms is respectfully traversed. The words "relatively low" have been taken out of context. They are part of the phrase "material (112) having a relatively low free charge carrier density". A person skilled in this art would understand what kind of material this description embraces. It is commonly accepted by persons knowledgeable in materials physics that the term "relatively low free charge carrier density" refers to a material which behaves as a dielectric, such as glass, polymer, undoped or lightly-doped semiconductors. Moreover, the present specification incorporates by reference (page 4, line 15) US6,442,321 by one of the present inventors. US6,442,321 is the first in a series of US patents by this inventor which relate to the revolutionary finite width metal optical waveguide employed in the Schottky barrier photodetector of the present invention. (The other patents in the series are US6,614,960, US6,741,782, US6,801,691 and US6,823,111).

The finite width metal optical waveguide is described in US Patent No. 6,442,321, which establishes the nature of the waveguide (where the wave propagates along the interface between the finite width metal strip and the dielectric interface) and gives examples of both "relatively high" and "relatively low" free charge carrier density materials and their properties (Column 2, lines 17 - 25 and 33 - 38; Column 5, line 48; Column 18, lines 66 though to Column 19, line 12).

Accordingly, a person skilled in this art, being aware of these patents, would have no difficulty understanding the meaning of the term "material (112) having a relatively low free charge carrier density".

The term "of the same order" also has been taken out of context. Claim 1 clearly states that the strip has "finite width and thickness *with dimensions such that said optical radiation couples to the strip and propagates along the strip as a plasmon-polariton wave*" (emphasis added). International patent application number PCT/CA 02/00971, referenced on page 17, line 25 of the present specification, clearly describes what is meant by the term "same order" and teaches how to calculate appropriate dimensions for a given strip/surrounding material combination.

It is submitted, therefore, that, contrary to the assertion in the Office Action, a skilled person would indeed find it possible to determine the intended scope of the claim.

In paragraph 8, the examiner rejected claims 1 - 3, 12, 14, 20, 23 and 24 under 35 U.S.C. 102(b) as anticipated by US patent No. 4,857,973 (Yang *et al.*). (It is noted that US4,857,973 was cited by the present applicants and discussed in the passage extending from page 2, line 24 - page

3, line 2 of their specification.) This rejection is respectfully traversed for the reasons set out below.

The statement "Regarding claim 1, Yang et al. teach a Schottky barrier photodiode means (Figs. 5 and 6, for example), comprising: a waveguide structure formed by a metallic strip (58);" is simply incorrect. Figures 5 and 6 of Yang *et al.* disclose a conventional dielectric waveguide structure implemented using silicon 66 on insulator 64, where the "light propagation area" 68 is directly under the rib 70 formed from the silicon layer 66. The rib provides lateral confinement while vertical confinement is provided via the top and bottom silicon interfaces. The dielectric waveguide therefore supports a conventional dielectric waveguide mode. A metal 58 introduced within a portion of the dielectric waveguide forms a Schottky barrier with the silicon layer 66. Thus, in Yang *et al.*'s photodetector, the metal "loads" the dielectric waveguide along which the dielectric waveguide mode propagates. This is completely different from the photodetector of the present invention, which does not use a conventional dielectric waveguide but rather uses a finite width metal optical waveguide which comprises a metallic strip (Figure 4, 100) surrounded by a low free charge carrier density material (semiconductor) supporting and confining a plasmon-polariton mode.

There is no dielectric waveguide in embodiments of the present invention and therefore no conventional dielectric waveguide mode. The metal-semiconductor combination (of the preferred embodiment shown in Figure 4) forms the waveguide and the mode is a plasmon-polariton mode following the teachings of US 6,442,321.

Advantageously, the one metallic strip (100) performs two functions, namely waveguide element and Schottky barrier element. Hence, the same metal-dielectric interfaces along which the plasmon-polariton wave propagates also form the Schottky barrier which provides the detection mechanism. This greatly improves the device which, as explained in applicants' specification at page 18, lines 26 - 28, "as compared with the endfire photodetector disclosed by Yang *et al.* in US 4,857,973, can achieve much higher, if not total, absorption of the incident light and provide better responsivity for a given dark current."

It is submitted, therefore, that claims 1 - 3, 12, 14, 20, 23 and 24 are not anticipated by US 4,857,973 (Yang *et al.*)

In paragraph 10, the examiner rejected claims 15, 16 and 21 under 35 U.S.C. 103(a) as unpatentable over Yang *et al.* in view of US patent No. 3,638,300 (Fox *et al.*) and in paragraph 11 rejected claim 22 under 35 U.S.C. 103(a) as unpatentable over Yang *et al.* in view of US patent No. 5,977,718 (Christenson). The rejection of claims 15, 16, 21 and 22 is respectfully traversed. These claims are dependent directly or indirectly upon claim 1. As explained above, claim 1 is patentable over the disclosure by Yang *et al.* Claims 15, 16, 21 and 22 merely specify certain materials for the finite width metallic optical waveguide. Since Yang *et al.* do not disclose or suggest the basic structure of the waveguide of claims 15, 16, 21 and 22, it follows that the notional person skilled in this art would not be led or motivated to combine US4,857,973 with either US3,638,300 or US5,977,718 and, even if he did, the combination would not render claims 15, 16, 21 and 22 obvious.

In view of the foregoing, it is submitted that all claims of record are patentable over the cited references and early and favourable reconsideration of the application is respectfully requested.

Respectfully submitted,

13 May 2005

T. Adams

Thomas Adams, Reg. No. 31,078

Adams Patent and Trademark Agency
Box 11100, Station H
Ottawa, Ontario
Canada K2H 7T8
Tel: (613) 254 9111
Fax: (613) 254 9222
Docket No. AP973US